

CLAIMS

What is claimed is:

1. A memory device comprising:
at least one bank comprised of memory cells organized into a plurality of rows of memory cells; and
control logic coupled to the at least one bank, and responsive to the receipt by the memory device of a row activate command to open a specific row such that if no rows are open when the row activate command is received then the specific row within the at least one bank is opened, and that if a different row from the specified row in the bank is open when the row activate command is received then the different row is closed and the specified row is opened.
3. The memory device of claim 1, wherein the memory device is a dynamic random access memory, wherein the row activate command is received via a memory bus coupled to the memory device, and wherein the transfer of data across the memory bus is synchronized to a clock signal transmitted across the memory bus such that portions of data are able to be transferred with each half clock cycle.
3. The memory device of claim 1, wherein the control logic is programmable to close the different row only in response to the receipt of an explicit precharge command.
4. The memory device of claim 1, wherein the memory device provides an indication that is readable by another device via a memory bus to which the

memory device is coupled of the ability of the control logic of the memory device to both open a specific row and close a different row in response to receipt of a row activate command to open a specific row.

5. The memory device of claim 5, wherein the indication further provides a specification of the amount of time required by the memory device to close a different row.

6. The memory device of claim 5, further comprising a separately accessible non-volatile memory storage from which an indication of the ability of the control logic of the memory device to both open a specific row and close a different row in response to a row activate command may be read.

7. A controlling device comprising:

a first storage location in which data concerning rows within a bank of memory cells within a memory device is stored; and

control logic coupled to the first storage location to check data within the first storage location to determine if a specific row is already open within the bank, to check data within the first storage location to determine if a different row is open if the specific row is not already open, to transmit a row activate command and wait a first predetermined period of time for the row activate command to open the specific row to be carried out if the specific row is determined to not be open and no other rows are open within the bank before transmitting an access command involving that bank, and to transmit a row activate command that further implies a precharge command and wait a second predetermined period of time for both the row activate command to open the specific row and the implied precharge command to close the different row to

be carried out if the specific row is determined to not be open and a different is open within the bank before transmitting an access command involving that bank.

8. The controlling device of claim 7, wherein a row activate command is transmitted by the control logic to the memory device via a memory bus coupled to both the controlling device and the memory device, and wherein the transfer of data across the memory bus is synchronized to a clock signal transmitted across the memory bus such that portions of data are able to be transferred with each half clock cycle.

9. The controlling device of claim 7, further comprising a second storage location coupled to the control logic to store an indication from a memory device as to whether or not the memory device is capable of responding to the receipt of a row activate command to open a specific row in a bank where a different row is open by carrying out a precharge operation to close the different row and carrying out a row activate operation to open the specific row.

10. The controlling device of claim 9, wherein the second storage location further stores an indication from the memory device of the length of the period of time required by the memory device to carry out the precharge operation to close the different row.

11. The controlling device of claim 9, wherein the control logic accesses the second storage location to check whether or not a given memory device is capable of responding to the receipt of a row activate command to open a

specific row in a bank where a different row is open by carrying out a precharge operation to close the different row and carrying out a row activate command to open the specific row.

12. A computer system comprising:

a processor;

a memory device having at least one bank in which a plurality of memory cells are organized into rows; and

a memory controller coupled to the processor and to the memory device to transmit a row activate command to open a specific row within the at least one bank of the memory device and wait a first predetermined period of time for a row activate operation to be carried out by the memory device before transmitting a data access command to the specific row if there are no rows open within the at least one bank, and to transmit a row activate command to open a specific row within the at least one bank of the memory device and wait a second predetermined period of time for both a precharge operation to close a different row and a row activate operation to be carried out before transmitting a data access command to the specific row if a different row other than the specific row is open.

13. The computer system of claim 12, wherein the memory controller further comprises logic to receive an indication from the memory device as to whether or not the memory device is capable of responding to the transmission of a row activate command by the memory controller to open a specific row within the at least one bank when a different row is open in the at least one bank by carrying out a precharge operation to close the different row and carrying out a row activate operation to open the specific row.

14. The computer system of claim 13, wherein the memory controller further comprises logic to receive an indication from the memory device as to the amount of time required to carry out the precharge operation, and to wait for the second predetermined period of time wherein the length of the second predetermined amount of time is determined based at least in part on indication from the memory device as to the amount of time required to carry out the precharge operation.

15. The computer system of claim 12, wherein the memory controller and the memory device are coupled via a memory bus on which the transfer of data is synchronized to a clock signal transmitted across the bus, and wherein portions of data can be transferred at least on every half clock cycle.

16. A method comprising:

determining whether or not a specific row within a bank of memory cells in which a plurality of memory cells are organized into rows within a memory device is open;

determining whether or not a different row within the bank is open if the specific row is closed;

transmitting a row activate command to the memory device to open the specific row and waiting for a first predetermined period of time for a row activate operation to be carried out by the memory device before transmitting a command for a data access operation involving the specific row to the memory device if it is determined that no rows are open within the bank; and

transmitting a row activate command to the memory device and waiting for a second predetermined period of time for both a row activate operation to

open the specific row and a precharge operation to close a different row to be carried out by the memory device before transmitting a command for a data access operation involving the specific row to the memory device if it is determined that a different row is open within the bank.

17. The method of claim 16, receiving an indication from the memory device as to whether or not the memory device has the capability of responding to a row activate command to open a specific row within the bank on an occasion in which the specific row is closed and a different row is open by carrying out a precharge operation to close the different row and carrying out a row activate operation to open the specific row.

18. The method of claim 17, further comprising preceding the transmitting of a row activate command to the memory device to open a specific row within the bank with transmitting a precharge command to the memory device to close a different row in the bank that is open if there is no indication from the memory device that the memory device supports carrying out a precharge operation to close the different row without the transmission of a precharge command.

19. A method comprising:
receiving a row activate command to open a specific row within a bank of memory cells in which a plurality of memory cells are organized into rows;
carrying out a row activate operation to open the specific row if no rows are opened in the bank; and

carrying out both a precharge operation to close a different row and a row activate operation to open the specific row if the specific row is closed and the different row is open.

20. The method of claim 19, further comprising providing a memory controller an indication of having the capability to respond to the transmission of a row activate command to activate a specific row within a bank by carrying out a precharge command to close a different row within the bank in addition to carrying out a row activate command to open the specific row if the specific row is closed and the different row is open.

21. A machine-accessible medium comprising code that when executed by a processor within an electronic device, causes the electronic device to:

check whether or not a memory device is capable of responding to a row activate command to open a specific row in a bank of memory cells having a plurality of memory cells organized in to rows by carrying out both a precharge operation to close a different row and a row activate operation to open the specific row if the specific row is closed and the different row is open;

program a memory controller to transmit a row activate command to activate a specific row in a bank on an occasion where the specific row is closed and a different row is open and to wait a predetermined period of time for the memory device to carry out both a precharge command to close the different row and row activate command to open the specific row before transmitting a data access command involving the specific row to the memory device.

22. The machine-accessible medium of claim 21, further causing the processor to determine the length of the predetermined period of time based on

an indication from the memory device as to the amount of time required to carry out a precharge operation in response to the receipt of a row activate command.